



# Marshall Space Flight Center

## Powering the Future of Science and Exploration



Steven C. Miley, Associate Director for Operations  
Engineering Directorate  
August 6, 2009

# NASA's Strategic Goals

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Retire the SHUTTLE by 2010

Complete the INTERNATIONAL SPACE STATION

Return to THE MOON by 2020

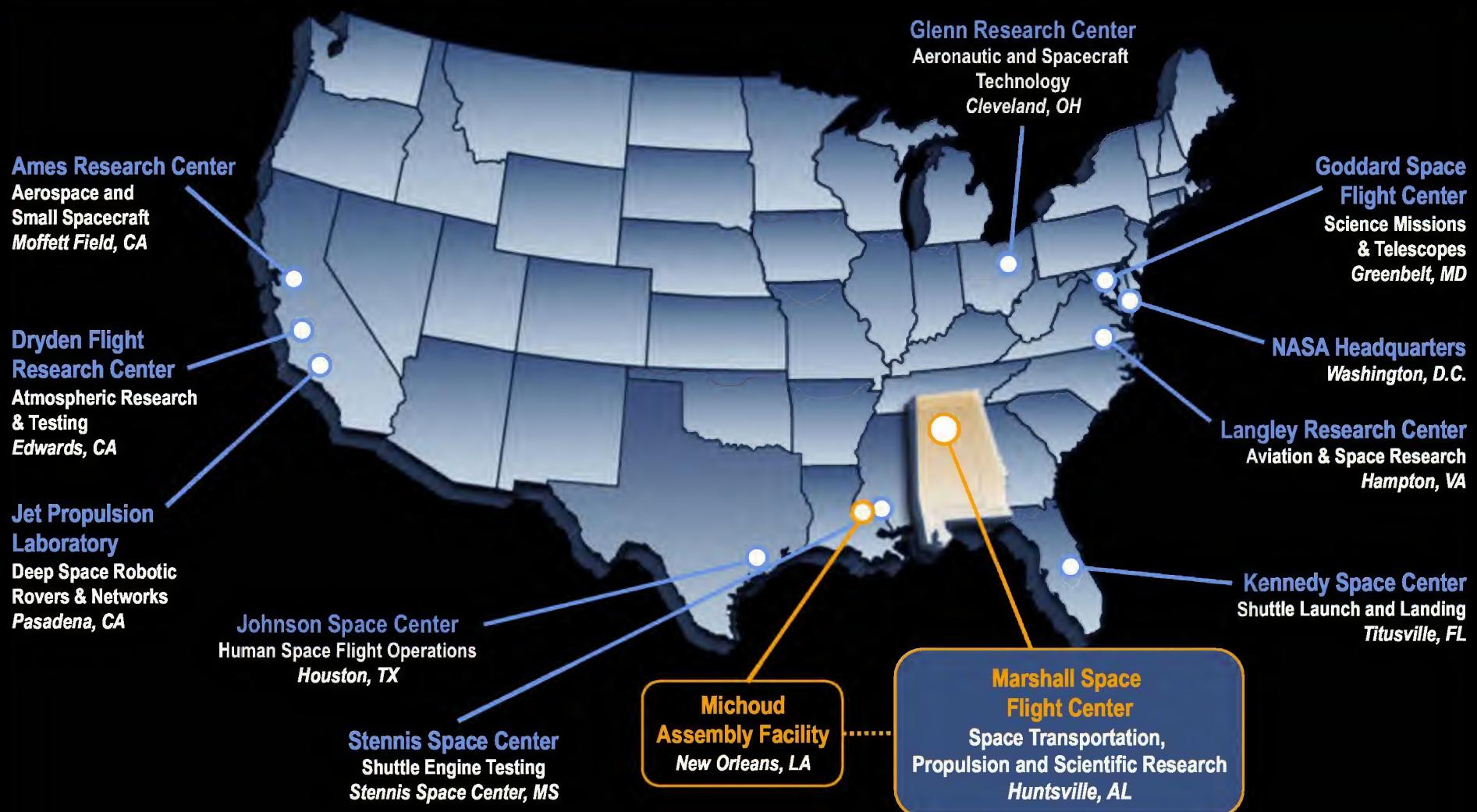
Carry out MISSIONS of SCIENTIFIC DISCOVERY

Advance U.S. TECHNOLOGY LEADERSHIP

Pursue PARTNERSHIPS with commercial space sector

Provide critical capabilities to SUPPORT NASA's MISSION

# NASA Around the Country



**Marshall Is a Space Transportation and Science Center**

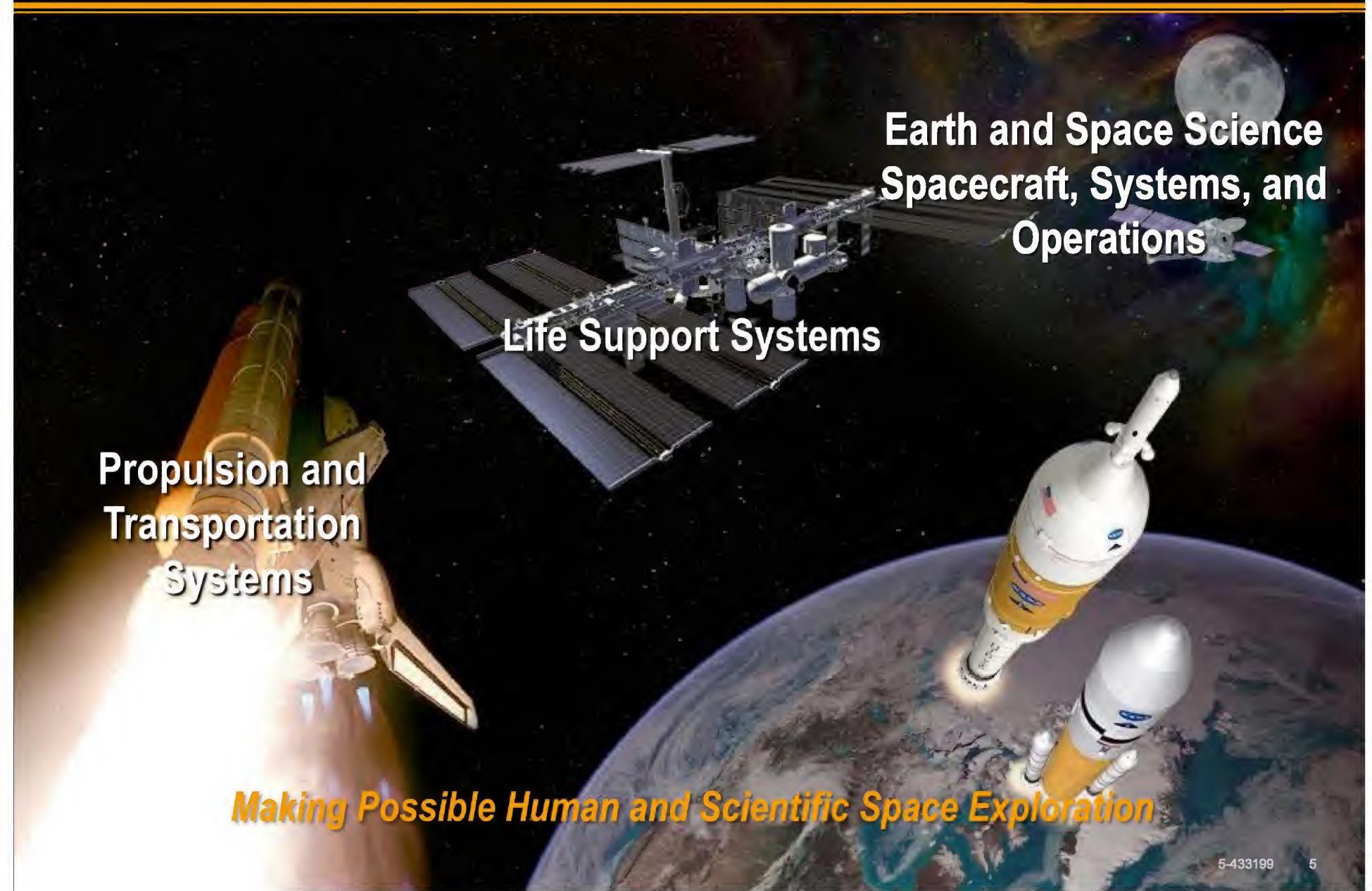
# Marshall's History

The diagram illustrates the evolution of Marshall Space Flight Center's rocket fleet. It features ten rocket models of increasing size and complexity, set against a background of a cloudy sky. Below each model is its name and the year(s) it was active.

Jupiter C	Mercury-Redstone	Saturn I	Apollo-Saturn IB	Apollo-Saturn V	Skylab-Saturn V	Saturn IB Apollo-Soyuz	Space Shuttle	Ares I	Ares V
1958	1961	1961-1965	1966-1968	1967-1972	1973	1975	1981-Present	2015 (Planned)	2020 (Planned)

***Delivering Space Transportation Solutions for 50 Years***

# Marshall's Missions



# Marshall Statistics: From Exploration to Opportunity



**\$2.6 billion**  
budget in fiscal year 2008



**6<sup>th</sup> largest**  
employer in the Huntsville -  
Madison county area



**> 7,600**  
employees at Marshall  
(2,634 civil service employees  
in fiscal year 2008)



**4.5 million**  
square feet of space  
in Huntsville



**\$1 billion**  
impact to Alabama economy



**2.2 million**  
square feet of manufacturing  
space at Michoud Assembly  
Facility in New Orleans

***Providing an Economic Engine based on Science and Technology***

# Propulsion and Transportation Systems

## Shuttle Propulsion Sustaining Engineering

Main engines, external tank, solid rocket boosters

Transitioning to Ares/Orion for missions beyond Earth orbit

Best of Saturn and Shuttle technology used to develop future vehicles



## Ares Design and Development

Successor to Shuttle for routine space access

Part of NASA's Constellation Program

First test flight is scheduled for 2009

***Building and Sustaining Rockets, from Saturn to Shuttle to Ares***

# Life Support Systems

## Current Work

- Producing clean air and recycling water
- Providing around-the-clock science operations support
- Making science experimentation possible in space

## Future Work

- Exploration life support systems
- Radiation hardened electronics
- Altair Lunar Lander systems
- Lunar resources utilization



Payload  
Operations Center



Lunar Resources



Environmental  
Control & Life Support



Altair Lunar  
Lander



Working in Space



*Pioneering Technologies for Living and Working on the New Frontier*

# Earth Science

## Environmental Monitoring

- Understanding climate change and weather patterns



Global Hydrology & Climate Center



HIRAD

## Weather Prediction

- Improving forecasts and weather warning times



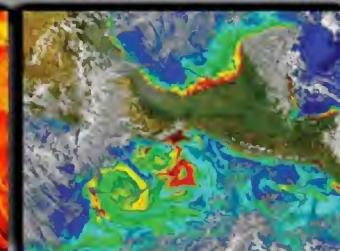
SPoRT



Environmental Monitoring

## Hurricane Research

- Predicting the intensity and dynamics of storms



SERVIR

*Understanding Our Planet to Improve Safety and Save Lives*

# Space Science

## Preparing for human return to the Moon

- Robotic missions to search for water ice and gather data
- Program office at Marshall

## Learning about our solar system

- Spacecraft to analyze the inner workings of the sun, planets, comets and asteroids
- Program management and instrument development

## Learning about our universe

- Scientific instruments to reveal information about activity in deep space
- Management, design and construction



LCROSS



HINODE



Discovery/  
New Frontiers



Chandra



JWST/  
Marshall XRCF

*Gaining Knowledge about the Moon, Solar System, and Universe*

# NASA Innovation Creates New Jobs, Markets, and Technologies

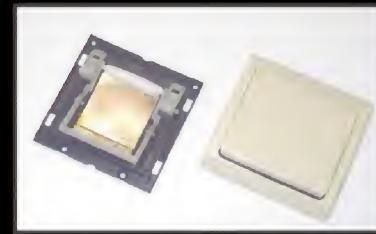
- **Personal Health**

- Eye tracker for LASIK surgery
- Breast biopsy system



- **Consumer Products**

- Wireless light switch
- Remote appliance programmer
- Global Positioning Systems (GPSs)



- **Environmental**

- Water Filtration system
- Environmentally friendly
- Chemical cleanup



- **Security**

- Stair-climbing tactical robot
- Crime scene video enhancement



For more information see <http://technology.jsc.nasa.gov>

***Every Dollar Invested in Space is Spent on Earth***

# NASA Inspires Future Generations of Explorers

- **The Great Moonbuggy Race**
  - 75 student teams from around the world
  - More than 500 high school, college, and university students
  - Designed and raced their rovers on a simulated Moon-scape
- **NASA Student Launch Initiative**
  - 450 middle and high school students participated in 2009
  - Built and flew reusable rockets to 1-mile high with a science payload
- **Students need motivating goals and teachers with information to share**
- **NASA continues to develop educational tools and experiences that inspire, educate, and motivate**
- **Space exploration offers new economic opportunities through technology and resource development**



***Learning through Teamwork***

# Why Explore?



**International Collaboration**  
**Technological advancement**  
**Scientific discovery**  
**Economic opportunity**  
**National security**



***Bringing the Benefits of Space Exploration down to Earth***



*For more information*

**[www.nasa.gov](http://www.nasa.gov)**